

APPENDIX 1: ATTACHMENT REQUIREMENTS FOR WIND UPLIFT RESISTANCE

TABLE	DECK	APPLICATION	TYPE	DESCRIPTION	PAGE
1A	Wood	New, Reroof (Tear-Off) or Recover	B-1	Mechanically Attached Base Insulation, Bonded Top Insulation, Bonded Roof Cover	12
1B	Wood	New or Reroof (Tear-Off)	B-3	Mechanically Attached Anchor Sheet, Bonded Insulation, Bonded Roof Cover	13
1C	Wood	New, Reroof (Tear-Off) or Recover	B-3	Mechanically Attached Anchor Sheet, Bonded Insulation, Bonded Roof Cover	16
1D	Wood	New, Reroof (Tear-Off) or Recover	C-1	Mechanically Attached Insulation, Bonded Roof Cover	18
1E	Wood	New, Reroof (Tear-Off) or Recover	C-2	Induction Welded Roof Cover	25
1F	Wood	New, Reroof (Tear-Off) or Recover	D-1	Insulated, Mechanically Attached Roof Cover	27
1G	Wood	New, Reroof (Tear-Off) or Recover	E-1	Non-Insulated, Mechanically Attached Roof Cover	28
1H	Wood	New, Reroof (Tear-Off) or Recover	E-2	Non-Insulated, Mechanically Attached Base Sheet, Bonded Roof Cover	28
2A	Steel	New or Reroof (Tear-Off)	A-1	Bonded Insulation, Bonded Roof Cover	30
2B	Steel	New or Reroof (Tear-Off)	A-2	Bonded Vapor Barrier, Bonded Insulation, Bonded Roof Cover	31
2C	Steel or Structural concrete	New, Reroof (Tear-Off) or Recover	B-1	Mechanically Attached Base Insulation, Bonded Top Insulation, Bonded Roof Cover	34
2D	Steel or Structural concrete	New, Reroof (Tear-Off) or Recover	B-1	Mechanically Attached Base Insulation, Bonded Top Insulation, Bonded Base and Cap Ply	48
2E	Steel	New or Reroof (Tear-Off)	B-2	Mechanically Attached Thermal Barrier, Bonded Vapor Barrier, Bonded Insulation, Bonded Roof Cover	53
2F	Steel or Structural concrete	New, Reroof (Tear-Off) or Recover	C-1	Mechanically Attached Insulation, Bonded Roof Cover	57
2G	Steel or Structural concrete	New, Reroof (Tear-Off) or Recover	C-1	Mechanically Attached Insulation, Bonded Base and Cap Ply	96
2H	Steel or Structural concrete	New, Reroof (Tear-Off) or Recover	C-1A	Thermal Barrier with Vapor Barrier, Mechanically Attached Insulation, Bonded Roof Cover	99
2I	Steel or Structural concrete	New, Reroof (Tear-Off) or Recover	C-2	Induction Welded Roof Cover	103
2J	Steel	New, Reroof (Tear-Off) or Recover	D-1	Insulated, Mechanically Attached Roof Cover	105
3A	Structural concrete	New or Reroof (Tear-Off)	A-1	Bonded Insulation, Bonded Roof Cover	110
3B	Structural concrete	New or Reroof (Tear-Off)	A-1	Bonded Insulation, Bonded Base and Cap Ply	131
3C	Structural concrete	New, Reroof (Tear-Off) or Recover	C-2	Induction-Welded Roof Cover	132
3D	Structural concrete	New, Reroof (Tear-Off) or Recover	F	Non-Insulated, Bonded Roof Cover	133
4A	Deck with Lightweight Concrete	New or Reroof (Tear-Off)	A-1	LWC to Deck, Bonded Insulation, Bonded Roof Cover	134
4B	Deck with Lightweight Concrete	New or Reroof (Tear-Off)	B-3	LWC to Deck, Mechanically Attached Anchor Sheet, Bonded Insulation, Bonded Roof Cover	136
4C	Deck with Lightweight Concrete	New or Reroof (Tear-Off)	B-3	LWC to Deck, Mechanically Attached Anchor Sheet, Bonded Insulation, Bonded Roof Cover	138
4D	Deck with Lightweight Concrete	New, Reroof (Tear-Off) or Recover	C-2	LWC to Deck, Optional Insulation, Through-attached Induction Welded Roof Cover	139
4E	Deck with Lightweight Concrete	New, Reroof (Tear-Off) or Recover	D-1	LWC to Deck, Through-attached Mechanically Attached Roof Cover	139
4F	Deck with Lightweight Concrete	New, Reroof (Tear-Off) or Recover	D-1	LWC to Deck, Through-attached Mechanically Attached Roof Cover	141
4G	Deck with Lightweight Concrete	New or Reroof (Tear-Off)	E-2	LWC to Deck, Mechanically Attached Base Sheet, Bonded Roof Cover	142
4H	Deck with Lightweight Concrete	New or Reroof (Tear-Off)	F	LWC to Deck, Bonded Roof Cover	144
4I	Deck with Lightweight Concrete	New or Reroof (Tear-Off)	F	LWC to Deck, Bonded Roof Cover	145
4J	Deck with Lightweight Concrete	New or Reroof (Tear-Off)	F	LWC to Deck, Bonded Base and Cap Ply	146
4K	Deck with Lightweight Concrete	New or Reroof (Tear-Off)	F	Vapor Barrier to Deck, LWC to Vapor Barrier, Bonded Roof Cover	146
5A	Cementitious wood fiber	New or Reroof (Tear-Off)	A-1	Bonded Insulation, Bonded Roof Cover	147
5B	Cementitious wood fiber	New, Reroof (Tear-Off) or Recover	C-1	Mechanically Attached Insulation, Bonded Roof Cover	148
5C	Cementitious wood fiber	New or Reroof (Tear-Off)	F	Non-Insulated, Bonded Roof Cover	148
6A	Existing gypsum	Reroof (Tear-Off)	A-1	Bonded Insulation, Bonded Roof Cover	149
6B	Existing gypsum	Reroof (Tear-Off)	B-1	Mechanically Attached Base Insulation, Bonded Top Insulation, Bonded Roof Cover	151
6C	Existing gypsum	Reroof (Tear-Off)	B-3	Mechanically Attached Anchor Sheet, Bonded Insulation, Bonded Roof Cover	154
6D	Existing gypsum	Reroof (Tear-Off)	C-1	Mechanically Attached Insulation, Bonded Roof Cover	154
6E	Existing gypsum	Reroof (Tear-Off)	F	Non-Insulated, Bonded Roof Cover	155
7A	Various	Recover	A-1	Bonded Insulation, Bonded Roof Cover	156
7B	Wood or Steel	Recover	C-2	Induction Welded Roof Cover	195
7C	Steel	Recover	D-1	Insulated, Mechanically Attached Roof Cover	197
7D	Various	Recover	F	Non-Insulated, Bonded Roof Cover	198
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The following notes apply to the systems outlined herein:

- The roof system evaluation herein pertains to above-deck roof components. Roof decks and structural members shall be in accordance with FBC HVHZ requirements to the satisfaction of the Authority Having Jurisdiction. Deck-attachment details pertain to 'as-tested' conditions under [Testing Application Standard](#) TAS 114, Appendix J. [Tables 8A and 8B](#) provide guidance / limitations associated with use of fasteners from Hilti, Inc. to secure steel decking to structural members.
- Unless otherwise noted, fasteners and stress plates shall be as follows. Recessed plates are not for use with cement-based or gypsum-based hardboard coverboards. Fasteners shall be of sufficient length for the following engagements:

FASTENER/PLATE OPTIONS				
DECK TYPE	BY	PARTS		MINIMUM ENGAGEMENT
		LOOSE PARTS	PRE-ASSEMBLED PARTS	
Wood	GAF	Drill-Tec #12 Fastener, Drill-Tec #12 DP Fastener, Drill-Tec #12 DPH Fastener, Drill-Tec #14 Fastener or Drill-Tec #14 HD Fastener with Drill-Tec 3" Standard Steel Plate, Drill-Tec 3" Steel Plate, Drill-Tec AccuTrac Flat Plate, Drill-Tec AccuTrac Recessed Plate (insulation only), Drill-Tec 3" Flat Steel Plate or Drill-Tec 3" Recessed Steel Plate	Drill-Tec 3" ASAP Flat, Drill-Tec 3" ASAP Recessed, Drill-Tec ASAP 3S or Drill-Tec Heavy Duty ASAP Roofing Fastener Assembled with a 3" Metal Plate	Minimum ¾-inch plywood penetration or minimum 1-inch wood plank embedment
Steel	GAF	Drill-Tec #12 Fastener, Drill-Tec #12 DP Fastener, Drill-Tec #12 DPH Fastener, Drill-Tec #14 Fastener, Drill-Tec #14 HD Fastener, Drill-Tec XHD Fastener or Drill-Tec #15 EHD Fastener with Drill-Tec 3" Standard Steel Plate, Drill-Tec 3" Steel Plate, Drill-Tec AccuTrac Flat Plate, Drill-Tec AccuTrac Recessed Plate (insulation only), Drill-Tec 3" Flat Steel Plate or Drill-Tec 3" Recessed Steel Plate	Drill-Tec 3" ASAP Flat, Drill-Tec 3" ASAP Recessed, Drill-Tec ASAP 3S, Drill-Tec Heavy Duty ASAP Roofing Fastener Assembled with a 3" Metal Plate or Drill-Tec Extra Heavy Duty ASAP Roofing Fastener – Insulation	Minimum ¾-inch steel penetration and engage the top flute of the steel deck
	Note:	Unless otherwise noted, Drill Tec #12 DF Fastener or Drill Tec #14 DF Fastener with Drill Tec 3" DF Steel Insulation Plate may be used in place of Drill-Tec #12 Fastener or Drill-Tec #14 Fastener with Drill-Tec 3" Standard Steel Plate when used to secure DensDeck Prime, SECUROCK Gypsum-Fiber Roof Board or SECUROCK Ultralight Coated Glass-Mat Roof Board to steel deck, up to a maximum allowable design pressure (MDP) of -120.0 psf.		
	Note:	Unless otherwise noted, Drill Tec #12 DF Fastener or Drill Tec #14 DF Fastener with Drill Tec 3" DF Steel Insulation Plate may be used in place of Drill-Tec #12 Fastener or Drill-Tec #14 Fastener with Drill-Tec 3" Standard Steel Plate when used to secure min. 0.5-inch thick Structodek High Density Fiberboard Roof Insulation, EnergyGuard HD Polyiso Cover Board or EnergyGuard HD Plus Polyiso Cover Board or min. 1.5-inch EnergyGuard POLYISO INSULATION or EnergyGuard Ultra Polyiso Insulation to steel deck.		
Structural Concrete	GAF	Drill-Tec #14 Fastener, Drill-Tec #14 HD Fastener or Drill-Tec CD-10 with Drill-Tec 3" Standard Steel Plate, Drill-Tec 3" Steel Plate, Drill-Tec AccuTrac Flat Plate, Drill-Tec AccuTrac Recessed Plate (insulation only), Drill-Tec 3" Flat Steel Plate or Drill-Tec 3" Recessed Steel Plate	Drill-Tec 3" ASAP Flat (#14 only) or Drill-Tec Heavy Duty ASAP Roofing Fastener Assembled with a 3" Metal Plate	Minimum 1.25-inch embedment. Fasteners installed with a pilot hole in accordance with the fastener manufacturer's published installation instructions
	Note:	Unless otherwise noted, Drill Tec #14 DF Fastener with Drill Tec 3" DF Steel Insulation Plate may be used in place of Drill-Tec #14 Fastener with Drill-Tec 3" Standard Steel Plate when used to secure min. DensDeck Prime, SECUROCK Gypsum-Fiber Roof Board or SECUROCK Ultralight Coated Glass-Mat Roof Board to structural concrete deck, up to a maximum allowable design pressure (MDP) of -120.0 psf.		
	Note:	Unless otherwise noted, Drill Tec #14 DF Fastener with Drill Tec 3" DF Steel Insulation Plate may be used in place of Drill-Tec #14 Fastener with Drill-Tec 3" Standard Steel Plate when used to secure min. 0.5-inch thick Structodek High Density Fiberboard Roof Insulation, EnergyGuard HD Polyiso Cover Board or EnergyGuard HD Plus Polyiso Cover Board or min. 1.5-inch EnergyGuard POLYISO INSULATION or EnergyGuard Ultra Polyiso Insulation to structural concrete deck.		

- Unless otherwise noted, insulation may be any one layer or combination of FBC Approved (Local or Statewide) board(s) that meet FBC HVHZ 1516 and, for foam plastic, FBC Chapter 26, when installed with the roof cover.
- Minimum 200 psi, minimum 2-inch thick FBC HVHZ Approved lightweight insulating concrete may be substituted for, or installed below, rigid insulation board for System Types B-1, C-1, C-2, D-1 or D-2, whereby fasteners are installed through the lightweight insulating concrete to engage the structural deck. The structural deck shall be of equal or greater type, thickness and strength to the steel and structural concrete deck listings. Roof decks and structural members shall be in accordance with FBC requirements to the satisfaction of the Authority Having Jurisdiction. This is a wind uplift resistance allowance and does not purport to address non-wind-uplift-related issues, such as deck venting or moisture levels within the LWIC and the potential effect on overlying components. If mechanical attachment to the structural deck through lightweight insulating concrete is proposed, field withdrawal resistance testing shall be performed to confirm equivalent or determine enhanced fastening patterns and density. All testing and fastening design shall be in compliance with [Testing Application Standard](#) TAS 105 and [Roofing Application Standard](#) RAS 117 and/or RAS 137. Calculations shall be prepared, signed and sealed by a qualified design professional.
- Preliminary insulation attachment: Unless otherwise noted, use FBC HVHZ Approved roofing fasteners and plates; minimum four per 4 x 8 ft board or minimum two per 4 x 4 ft board.

- 6 Unless otherwise noted, insulation adhesive application rates are as follows.
- ✓ Ribbon or bead width is at the time of application; the ribbons/beads shall expand as noted in the manufacturer's published instructions.
 - ✓ If applying hot asphalt to concrete deck, deck shall be primed with ASTM D41 primer.
 - ✓ When multiple layers(s) of insulation and/or coverboard are installed in ribbon-applied adhesive, board joints shall be staggered.
 - ✓ The maximum edge distance from the adhesive ribbon to the edge of the insulation board shall be not less than one-half the specified ribbons spacing.

INSULATION ADHESIVE REFERENCES				
By	ADHESIVE	REFERENCE	FBC FILE OR NOA	MINIMUM RATE
GAF	GAF LRF Adhesive M	'LRF-M'	23-0802.14	Continuous 0.75 to 1-inch ribbons, 12-inch o.c.
GAF	GAF LRF Adhesive M Canister	'LRF-M Canister'	N/A	Continuous 1 to 1.5-inch ribbons, 12-inch o.c.
GAF	GAF LRF Adhesive XF	'LRF-XF'	N/A	Continuous 0.75 to 1-inch ribbons, 12-inch o.c.
OMG, Inc.	OlyBond 500 Adhesive Fastener	'OB500'	24-0422.18	Continuous 0.75-inch wide ribbons, 12-inch o.c. (PaceCart, SpotShot or Canister)
Generic, ASTM D312, Type IV	hot asphalt	N/A	N/A	Full coverage at 25-30 lbs/square

- 7 Unless otherwise noted, all insulations are flat-stock or taper board of the minimum thickness noted. Tapered polyisocyanurate at the following thickness limitations may be substituted with the following Maximum Design Pressure (MDP) limitations. In no case shall these values be used to 'increase' the MDP listings in the tables; rather if MDP listing below meets or exceeds that listed for a particular system in the tables, then the thinner board listed below may be used as a drop-in for the equivalent thicker material listed in the table.

MDP LIMITATIONS FOR TAPERED POLYISOCYANURATE INSULATIONS				
ADHESIVE	INSULATION		MIN. TAPERED THICKNESS (IN)	MDP (psf)
	LISTED PRODUCT	FBC FILE OR NOA		
LRF-M	EnergyGuard Polyiso Insulation, EnergyGuard Ultra Polyiso Insulation	FL16311 or 24-1114.02	0.5	-232.5
LRF-XF	EnergyGuard Polyiso Insulation, EnergyGuard Ultra Polyiso Insulation	FL16311 or 24-1114.02	0.5	-292.5
LRF-XF	EnergyGuard RA	25-0123.02	0.5	-487.5
OB500	EnergyGuard Polyiso Insulation, EnergyGuard Ultra Polyiso Insulation	24-1114.02	0.5	-292.5
OB500	EnergyGuard RA	25-0123.02	0.5	-487.5
Hot asphalt	Any EnergyGuard polyisocyanurate listed with adhesive herein	Various	0.5	-240.0

- 8 Bonded polyisocyanurate insulation boards shall be maximum 4 x 4 ft.
- 9 For mechanically attached components, the maximum design pressure for the selected assembly shall meet or exceed at least the Zone 1 PRIME design pressure determined in accordance with FBC HVHZ 1620 or [Roofing Application Standard](#) RAS 128. Elevated pressure zones shall employ an attachment density designed by a qualified design professional to resist the elevated pressure criteria in accordance with [Roofing Application Standard](#) RAS 117 or RAS 137. *This extrapolation is not permitted for systems marked with an asterisk*
- 10 For assemblies marked with an asterisk*, the maximum design pressure for the selected assembly shall meet or exceed critical design pressure determined in accordance with FBC Chapter 16. No rational analysis is permitted for these systems.
- 11 For mechanically attached components over existing decks, fasteners shall be tested in the existing deck for withdrawal resistance in accordance with [Testing Application Standard](#) TAS 105. A qualified design professional shall review the data for comparison to the minimum requirements for the system. Should the fastener resistance be less than that required, a revised fastener spacing – prepared, signed and sealed by a qualified design professional in accordance with [Roofing Application Standard](#) RAS 117 or RAS 137 – may be submitted to the Building Official for review and acceptance.

- 12 Refer to FBC HVHZ 1521 for requirements and limitations regarding recover installations. For bonded insulation or membrane over existing substrates in a re-roof (tear off) or recover installation, the existing deck or existing roof surface shall be examined for compatibility with the adhesive to be installed. If any surface conditions exist that bring system performance into question, field uplift testing shall be conducted on mock-ups of the proposed new roof assembly. For bonded insulation or membrane over existing substrates in a recover installation, the existing roof system shall be capable of resisting project design pressures on its own merit to the satisfaction of the Authority Having Jurisdiction, as documented through field uplift testing in accordance with [Testing Application Standard](#) TAS 124.

- 12A Reference to “Existing gravel-surfaced asphaltic built-up roof, brushed / spudded and vacuumed to remove loose gravel” in Table 7A is intended to convey an as-tested condition whereby any loose-gravel that does not remain embedded in the asphalt flood coat after brushing and/or spudding be removed. The gravel that remains embedded in the asphalt flood coat remains.



- 13 For Structural Concrete Deck or Recover Applications using System Type C-1 the base insulation layer is optional and for System Type C-2, D-1 or D-2, the insulation is optional. Alternatively, an FBC HVHZ Approved insulation board or coverboard may be used as a separation layer. Board products shall be preliminarily attached prior to roof cover installation ([Note 5](#)). The separator component shall be documented as meeting FBC HVHZ 1516 and, for foam plastic, FBC Chapter 26, when installed with the roof cover in Recover applications.
- 14 Lightweight insulating concrete (LWIC) shall be cast in accordance with FBC Section 1917 to the satisfaction of the Authority Having Jurisdiction. For systems where specific LWIC is referenced, refer to current LWIC FBC HVHZ Product Approval for specific deck construction and limitations. Unless otherwise noted, for systems where specific LWIC is not referenced, the minimum design mix shall be 300 psi. In all cases, the minimum top-coat thickness is 2-inches. For LWIC over structural concrete, reference is made to FBC Section 1917.4.1, Point 1. For “pre-existent” LWIC references, listings were established through testing over lightweight concrete cast using only foaming agent (ASTM C896), water and Portland cement (ASTM C150), with no proprietary additives, in accordance with procedures adopted by Miami-Dade BCCO (FBC CER1592). Use of these listings in new construction or re-roof (tear-off) applications is at the discretion of the Designer or Record and Authority Having Jurisdiction.
- 15 For bonded membrane applications, unless otherwise noted, refer to the following.

MEMBRANE / ADHESIVE COMBINATIONS				
ROOF COVERS				
REFERENCE	MEMBRANE	ADHESIVE	APPLICATION	RATE
TPO-SA	EverGuard SA TPO	self-adhering	self-adhering	self-adhering
TPO-1121	EverGuard TPO	EverGuard TPO 1121 Bonding Adhesive	Contact (both sides)	0.8 to 1.0 gal/square/surface. For use over SECURROCK Gypsum-Fiber Roof Board, the application rate changes to 1.2 to 1.67 gal/sq/surface
TPO-3SQ	EverGuard TPO	EverGuard TPO 3 Square Low VOC Bonding Adhesive	Contact (both sides)	0.84 gal/square/surface
TPO-6SQ	EverGuard TPO	EverGuard TPO 6 Square Low VOC Bonding Adhesive	Contact (both sides)	0.46 gal/square/surface
TPO-QSA	EverGuard TPO	EverGuard TPO Quick Spray Adhesive	Contact (both sides)	Total application rate: ~0.71 lbs/sq (dry rate).

MEMBRANE / ADHESIVE COMBINATIONS				
ROOF COVERS				
REFERENCE	MEMBRANE	ADHESIVE	APPLICATION	RATE
TPO-QSALV50	EverGuard TPO	EverGuard TPO Quick Spray Adhesive LV 50	Contact (both sides)	Total application rate: ~0.84 lbs/sq (dry-rate).
			Note:	Detec Systems "TruGround Conductive Primer", applied at 0.4 gal/square to USG "SECUROCK Gypsum-Fiber Roof Board" prior to TPO-QSALV50 installation, has the following MDP Limitations. The lesser of the system listing vs. MDP below applies: ➤ Air Permeable Decks (wood, steel, CWF): MDP = -90.0 psf ➤ Monolithic Decks (structural concrete, poured gypsum, recover): MDP = -382.5 psf
TPO-WB	EverGuard TPO	EverGuard WB181 Bonding Adhesive	Contact (both sides)	To polyisocyanurate or Structodek High Density Fiberboard Roof Insulation at 0.63 gal/square and roof cover underside at 0.21 gal/square. To DensDeck Prime, DEXcell FA Glass Mat Roof Board or SECUROCK Gypsum-Fiber Roof Board at 0.63 to 0.75 gal/square and roof cover underside at 0.21 to 0.25 gal/square
TPOFB-HA1	EverGuard TPO Fleece-Back Membrane	hot asphalt	Wet lay (substrate)	25 lbs/square
TPOFB-HA2	EverGuard TPO Fleece-Back Membrane 100, 115 or 135			
TPOFB-LM1	EverGuard TPO Fleece-Back Membrane	GAF LRF Adhesive M	Wet lay (substrate)	1-inch wide ribbons spaced as noted in tables herein. Note: The adhesive ribbons are located directly over the adhesive ribbons used to secure the insulation when the cover is bonded to insulation less than 1.5-inch thick or "spatter pattern" at 0.55 to 0.75 gal/square.
TPOFB-LM2	EverGuard TPO Fleece-Back Membrane 100, 115 or 135			
TPOFB-LMC1	EverGuard TPO Fleece-Back Membrane	GAF LRF Adhesive M Canister	Wet lay (substrate)	"Spatter pattern" at 0.3 gal/square. Notes: TPOFB-LMC1 (spatter) is an acceptable alternate to TPOFB-LM1 (ribbons). Limited to MDP -90.0 psf over air permeable decks (wood, steel and CWF).
TPOFB-LMC2	EverGuard TPO Fleece-Back Membrane 100, 115 or 135	GAF LRF Adhesive M Canister	Wet lay (substrate)	"Spatter pattern" at 0.3 gal/square. Notes: TPOFB-LMC2 (spatter) is an acceptable alternate to TPOFB-LM2 (ribbons). Limited to MDP -90.0 psf over air permeable decks (wood, steel and CWF).
TPOFB-LO1	EverGuard TPO Fleece-Back Membrane	GAF LRF Adhesive O	Wet lay (substrate)	1-inch wide ribbons spaced as noted in tables herein. Note: The adhesive ribbons are located directly over the adhesive ribbons used to secure the insulation when the cover is bonded to insulation less than 1.5-inch thick.
TPOFB-LO2	EverGuard TPO Fleece-Back Membrane 100, 115 or 135			
TPOFB-OB1	EverGuard TPO Fleece-Back Membrane	OlyBond 500 Canister	Wet lay (substrate)	"Spatter pattern" at 0.32 gal/square (to insulation, coverboard or Tectum) "Spatter pattern" at 0.83 gal/square (to asphaltic base ply membrane). Note: TPOFB-OB1 (spatter) is an acceptable alternate to TPOFB-LO1 (ribbons).
TPOFB-OB2	EverGuard TPO Fleece-Back Membrane 100, 115 or 135	OlyBond 500 Canister	Wet lay (substrate)	"Spatter pattern" at 0.32 gal/square (to insulation, coverboard or Tectum) "Spatter pattern" at 0.83 gal/square (to asphaltic base ply membrane). Note: TPOFB-OB2 (spatter) is an acceptable alternate to TPOFB-LO2 (ribbons).
TPOFB-XF1	EverGuard TPO Fleece-Back Membrane	GAF LRF Adhesive XF	Wet lay (substrate)	"Spatter pattern" at 3.0 lbs/sq.
TPOFB-XF2	EverGuard TPO Fleece-Back Membrane 100, 115 or 135			
TPOFB-WB	EverGuard TPO Fleece-Back Membrane	EverGuard WB181 Bonding Adhesive	Wet lay (substrate)	0.83 to 1.0 gal/square
SBS-CA	Ruberoid 20 Smooth, Ruberoid Mop Smooth 1.5, Ruberoid Mop Smooth or Ruberoid Mop Plus Smooth	Matrix 102 SBS Membrane Adhesive		1.5 gal/square
SBS-CA1	Ruberoid 20 Smooth, Ruberoid Mop Smooth 1.5, Ruberoid Mop Smooth or Ruberoid Mop Plus Smooth	Matrix 101 Premium SBS Membrane Adhesive		1.5 – 2.0 gal/square
BP-AA	One or two plies GAFGLAS #75 Base Sheet, Tri-Ply #75 Base Sheet or GAFGLAS #80 Ultima Base Sheet	Hot asphalt		25 lbs/square
SBS-AA	One or two plies Ruberoid 20 Smooth, Ruberoid Mop Smooth 1.5, Ruberoid Mop Smooth or Ruberoid Mop Plus Smooth	Hot asphalt		25 lbs/square

MEMBRANE / ADHESIVE COMBINATIONS ROOF COVERS				
REFERENCE	MEMBRANE	ADHESIVE	APPLICATION	RATE
SBS-SA	LIBERTY SBS Self-Adhering Cap Sheet	Self-adhering		Full bond
SBS-TA	One or two plies Ruberoid HW 20 Smooth, Ruberoid HW 25 Smooth or Ruberoid HW Smooth	Torch-applied		Full bond

MEMBRANE / ADHESIVE COMBINATIONS VAPOR BARRIERS		
REFERENCE	MATERIAL	APPLICATION
VB-APP-TA (smooth)	Ruberoid Torch Smooth	Torch-applied
VB-APP-TA (granule)	Ruberoid Torch Granule	Torch-applied
VB-BP1-AA	One or more GAFGLAS #75 Base Sheet, Tri-Ply #75 Base Sheet, GAFGLAS #80 Ultima Base Sheet	Hot asphalt at 25 lbs/square.
VB-BP2-AA	One or two plies, GAFGLAS Ply 4, GAFGLAS Ply 4 M, Tri-Ply Ply 4 Ply Sheet, GAFGLAS FlexPly 6 or GAFGLAS FlexPly 6 M	Hot asphalt at 25 lbs/square.
VB-SBS-AA	Ruberoid 20 Smooth, Ruberoid Mop Smooth, Ruberoid Mop Smooth 1.5, Ruberoid Mop Plus Smooth or Ruberoid Mop Granule	Hot asphalt at 25 lbs/square.
VB-SBS-CA	Ruberoid 20 Smooth, Ruberoid Mop Smooth, Ruberoid Mop Smooth 1.5, Ruberoid Mop Plus Smooth or Ruberoid Mop Granule	Matrix 102 SBS Membrane Adhesive at 1.5 gal/sq.
VB-SBS-SA	Liberty SBS Self-Adhering Cap Sheet	Self-adhering
VB-SBS-TA	Ruberoid HW 20 Smooth, Ruberoid HW 25 Smooth, Ruberoid HW 30 Smooth, Ruberoid HW Smooth, Ruberoid HW Granule or Ruberoid HW Plus Granule	Torch-applied

- 15A For single-ply membranes in System Type D-1 steel deck applications, the roof membrane shall be run with its length perpendicular to the steel deck flutes.
- 15B For System Type C-2 (induction weld):
- 15B.1 Care shall be taken to ensure that the plates do not line-up with membrane seams. This condition may preclude proper induction welding of the membrane to the plates.
- 15B.2 For assemblies using Drill-Tec RhinoBond PVC XHD Tread Safe Plate:
- ✓ Drill-Tec Tread Safe Tubes are installed through the center hole of the Drill-Tec RhinoBond XHD Tread Safe Plate.
 - ✓ The insulation thickness shall be not less than 2-inches.
 - ✓ When rigid cement-board or gypsum-board is present, a 5/8-inch diameter hole shall be pre-drilled through the coverboard through which the Drill-Tec Tread Safe Tube is inserted prior to fastener installation.
- 15C The "Triposite Roofing System" noted herein consists of loose-laid GAFGLAS Stratavent Perforated Venting Base Sheet, followed by asphalt-applied one (1) or two (2) plies of Ruberoid 20 Smooth or three (3) plies of GAFGLAS FlexPly 6 or GAFGLAS FlexPly 6 M, followed by asphalt-applied EverGuard TPO Fleece-Back Membrane or EverGuard TPO Fleece-Back Membrane 100, 115 or 135 with 1-5/8" heat welded side laps.
- 15D Unless otherwise noted, the "Hybrid Roofing System" noted herein consists of asphalt-applied Ruberoid 20 Smooth, Ruberoid Mop Smooth, Ruberoid Mop Smooth 1.5, GAFGLAS #75 Base Sheet, Tri-Ply #75 Base Sheet or GAFGLAS #80 Ultima Base Sheet followed by asphalt-applied EverGuard TPO Fleece-Back Membrane or EverGuard TPO Fleece-Back Membrane 100, 115 or 135.
- 15E TruGround® Conductive Primer by Detec Systems, applied at 0.4 gal/square, may be applied to the substrate prior to membrane application for System Types C-2, D-1 or D-2 with no adverse effect on wind uplift resistance. For System Type C-2, do not contaminate the induction weld stress plate with primer.



- 15F TruGround® Conductive Primer by Detec Systems, applied at 0.4 gal/square, may be applied to the substrate prior to membrane-adhesive application with the following Maximum Design Pressure (MDP) limitations. In no case shall these values be used to 'increase' the MDP listings in the tables; rather if MDP listing below meets or exceeds that listed for a particular system in the tables, then the optional use of TruGround Conductive Primer is permissible.

LIMITATIONS FOR TRUGROUND® CONDUCTIVE PRIMER				
DECK TYPE	SYSTEM TYPE	SUBSTRATE OPTIONS	MEMBRANE/ADHESIVE OPTIONS (NOTE 15)	MDP (psf)
Any	A-1, B-1, B-2, B-3 or C-1	EnergyGuard HD Polyiso Cover Board, EnergyGuard HD Plus Polyiso Cover Board or Ultra HD Composite Insulation	TPO-SA, TPO-3SQ, TPO-QSALV50, TPOFB-OB1, TPOFB-OB2, TPOFB-XF1 or TPOFB-XF2	-142.5
		DensDeck Prime		
		DEXcell FA Glass Mat Roof Board		
		SECUROCK Gypsum-Fiber Roof Board		
Monolithic (structural concrete, lightweight concrete, recover)	A-1	EnergyGuard HD Polyiso Cover Board, EnergyGuard HD Plus Polyiso Cover Board or Ultra HD Composite Insulation	TPO-SA, TPO-3SQ or TPO-QSALV50	-285.0
			TPOFB-OB1, TPOFB-OB2, TPOFB-XF1 or TPOFB-XF2	-382.5
		DensDeck Prime	TPO-3SQ, TPO-QSALV50, TPOFB-XF1 or TPOFB-XF2	-285.0
			TPO-SA, TPOFB-OB1 or TPOFB-OB2	-382.5
		DEXcell FA Glass Mat Roof Board	TPO-SA, TPO-3SQ or TPO-QSALV50	-285.0
			TPOFB-OB1, TPOFB-OB2, TPOFB-XF1 or TPOFB-XF2	-382.5
		SECUROCK Gypsum-Fiber Roof Board	TPOFB-XF1 or TPOFB-XF2	-285.0
			TPO-SA, TPO-3SQ, TPO-QSALV50, TPOFB-OB1 or TPOFB-OB2	-382.5

16 Thermal Barrier and/or Vapor Barrier Options:

- 16A Structural Concrete Decks: The lesser of the MDP listings below vs. that for the selected assembly applies.

STRUCTURAL CONCRETE DECK: VAPOR BARRIER FOLLOWED BY ADHERED INSULATION					
OPTION #	PRIMER	VAPOR BARRIER (NOTE 15)		INSULATION ADHESIVE PER TABLE 3A	MDP (psf)
		TYPE	APPLICATION		
C-VB-1.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	VB-APP-TA (granule)	Torch-applied	Hot asphalt	-225.0
C-VB-2.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	VB-BP-AA1	Hot asphalt applied	Hot asphalt	-360.0
C-VB-3.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	VB-BP2-AA or VB-SBS-AA	Hot asphalt applied	Hot asphalt	-495.0
C-VB-4.	None	GAF SA Vapor Retarder XL	Self-adhering	LRF-M, 12-inch o.c.	-180.0
C-VB-5.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	VB-APP-TA (granule), VB-SBS-AA, VB-SBS-CA, VB-SBS-SA or VB-SBS-TA	See Note 15	LRF-M, 12-inch o.c.	-180.0
C-VB-6.	GAF SA Primer	GAF SA Vapor Retarder	Self-adhering	LRF-M, 12-inch o.c.	-202.5
C-VB-7.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	VB-BP1-AA, VB-BP2-AA or VB-SBS-AA	Hot asphalt applied	LRF-M, 12-inch o.c.	-495.0
C-VB-8.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	VB-APP-TA (granule)	Torch-applied	LRF-XF, 12-inch o.c.	-169.0
C-VB-9.	None	GAF SA Vapor Retarder XL	Self-adhering	LRF-XF, 12-inch o.c.	-180.0
C-VB-10.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	VB-APP-TA (granule), VB-SBS-AA, VB-SBS-CA, VB-SBS-SA or VB-SBS-TA	See Note 15	LRF-XF, 12-inch o.c.	-180.0
C-VB-11.	GAF SA Primer	GAF SA Vapor Retarder	Self-adhering	LRF-XF, 12-inch o.c.	-202.5
C-VB-12.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	VB-SBS-SA	Self-adhering	LRF-XF, 12-inch o.c.	-250.0
C-VB-13.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	VB-BP1-AA, VB-BP2-AA or VB-SBS-AA	Hot asphalt applied	LRF-XF, 12-inch o.c.	-262.5
C-VB-14.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	Ruberoid 30	Hot asphalt applied	LRF-XF, 12-inch o.c.	-270.0
C-VB-15.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	VB-APP-TA (smooth)	Torch-applied	OB500, 12-inch o.c.	-165.0
C-VB-16.	None	GAF SA Vapor Retarder XL	Self-adhering	OB500, 12-inch o.c.	-180.0
C-VB-17.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	VB-SBS-AA, VB-SBS-CA, VB-SBS-SA or VB-SBS-TA	See Note 15	OB500, 12-inch o.c.	-180.0
C-VB-18.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	VB-SBS-SA	Self-adhering	OB500, 12-inch o.c.	-187.5



STRUCTURAL CONCRETE DECK: VAPOR BARRIER FOLLOWED BY ADHERED INSULATION					
OPTION #	PRIMER	VAPOR BARRIER (NOTE 15)		INSULATION ADHESIVE PER TABLE 3A	MDP (psf)
		TYPE	APPLICATION		
C-VB-19.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	Ruberoid 20 Smooth	Matrix 102 SBS Membrane Adhesive at 1.5 gal/square	OB500, 12-inch o.c.	-202.5
C-VB-20.	GAF SA Primer	GAF SA Vapor Retarder	Self-adhering	OB500, 12-inch o.c.	-202.5
C-VB-21.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	VB-APP-TA (granule)	Torch-applied	OB500, 12-inch o.c.	-225.0
C-VB-22.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	Ruberoid HW Smooth	Torch-applied	OB500, 12-inch o.c.	-232.5
C-VB-23.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	VB-BP1-AA, VB-BP2-AA or VB-SBS-AA	Hot asphalt applied	OB500, 12-inch o.c.	-352.5

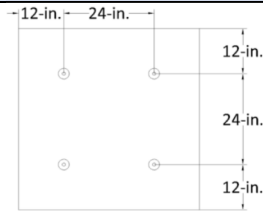
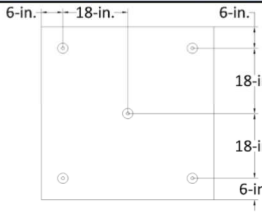
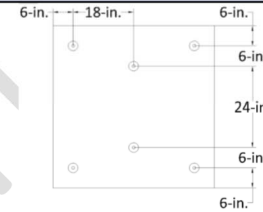
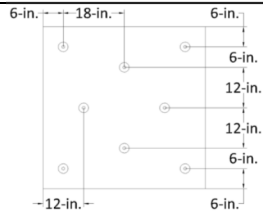
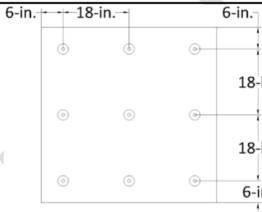
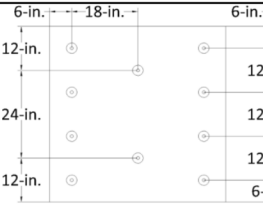
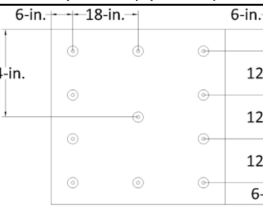
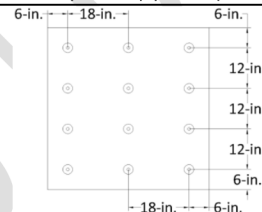
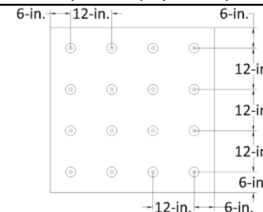
16B Decks followed by Vapor Barrier followed by Lightweight Concrete (LWC): The lesser of the MDP listings below vs. that for the selected assembly from the Lightweight Concrete tables applies:

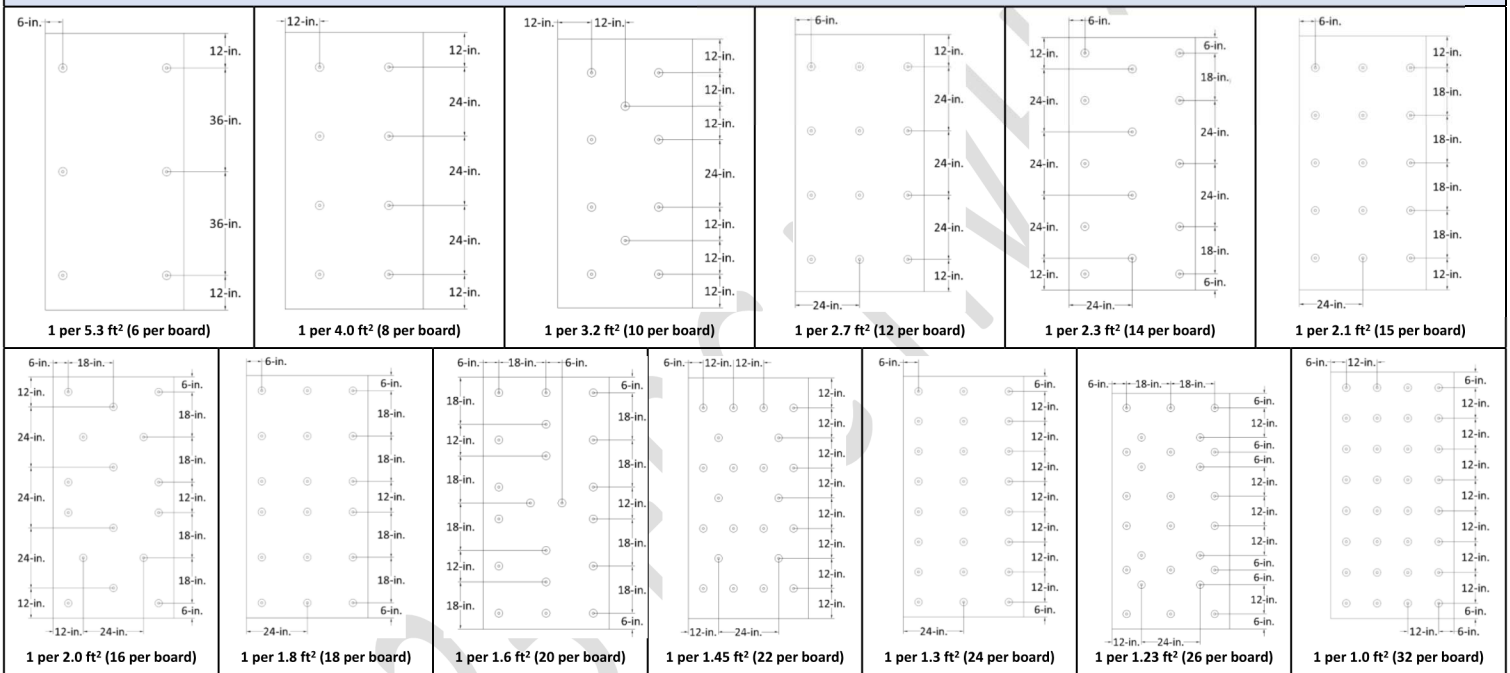
DECK FOLLOWED BY VAPOR BARRIER FOLLOWED BY CELLULAR LIGHTWEIGHT INSULATING CONCRETE					
OPTION #	PRIMER	VAPOR BARRIER		LIGHTWEIGHT CONCRETE PER TABLE 4A-4G (NOTE 14)	MDP (psf)
		TYPE	ATTACH		
LWC-VB-1.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	Base Ply (Optional): One or two plies Ruberoid HW 20 Smooth, Ruberoid HW 25 Smooth, Ruberoid HW Smooth Cap Ply: Ruberoid HW Granule, Ruberoid HW Granule FR, Ruberoid HW Plus Granule, Ruberoid HW Plus Granule FR	Torch-applied	Min. 200 psi Mearlcrete (NOA 24-0514.06)	-82.5
LWC-VB-2.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	Base Ply (Optional): One or two plies Ruberoid HW 20 Smooth, Ruberoid HW 25 Smooth, Ruberoid HW Smooth Cap Ply: Ruberoid HW Granule, Ruberoid HW Granule FR, Ruberoid HW Plus Granule, Ruberoid HW Plus Granule FR	Torch-applied	Min. 300 psi Celcore Cellular Concrete (NOA 24-0906.02)	-135.0
LWC-VB-3.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	Base Ply (Optional): One or two plies Ruberoid HW 20 Smooth, Ruberoid HW 25 Smooth, Ruberoid HW Smooth Cap Ply: Ruberoid HW Granule, Ruberoid HW Granule FR, Ruberoid HW Plus Granule, Ruberoid HW Plus Granule FR	Torch-applied	Min. 300 psi Elastizell (NOA 23-0817.05)	-302.5
LWC-VB-4.	Matrix 307 Premium Asphalt Primer or ASTM D41 primer	Ruberoid HW 20 Smooth, Ruberoid HW 25 Smooth, Ruberoid HW Smooth	Torch-applied	Min. 540 psi pre-existent cellular LWC	-358.0

16C For System Types B-1, B-2, C-1, C-2, D-1 or D-2, GAF SA Vapor Retarder or GAF SA Vapor Retarder XL may be installed atop the roof deck, or to a loose-laid thermal barrier of DensDeck, DensDeck Prime, DensDeck StormX Prime, DEXcell Glass Mat Roof Board, DEXcell FA Glass Mat Roof Board, DEXcell Cement Roof Board, SECUROCK Gypsum-Fiber Roof Board, SECUROCK Ultralight Coated Glass Mat Roof Board or SECUROCK Cement Roof Board, prior to installation of the insulation and roof cover. When adhering GAF SA Vapor Retarder to structural concrete, the substrate shall be primed with GAF SA Primer, TPO QSA or TPO QSA LV50. When adhering GAF SA Vapor Retarder to gypsum or cement boards, the substrate shall be primed with GAF SA Primer, TPO QSA, TPO QSA LV50 or Matrix 307 Premium Asphalt Primer. Refer to [FM Loss Prevention Data Sheet](#) 1-29 for design and installation limitations.

16D Fire barrier of VersaShield Solo™ Fire-Resistant Slip Sheet is optional in all assemblies when overlying components are mechanically fastened.

17 Unless otherwise noted, insulation or coverboard attachment patterns for Type B-1, Type B-2, Type C-1 and C-2 systems are as outlined below.

INSULATION ATTACHMENT PATTERNS – 4x4 FT BOARDS		
 1 per 4.0 ft² (4 per board)	 1 per 3.2 ft² (5 per board)	 1 per 2.7 ft² (6 per board)
 1 per 2.0 ft² (8 per board)	 1 per 1.8 ft² (9 per board)	 1 per 1.6 ft² (10 per board)
 1 per 1.45 ft² (11 per board)	 1 per 1.3 ft² (12 per board)	 1 per 1.0 ft² (16 per board)

INSULATION ATTACHMENT PATTERNS – 4x8 FT BOARDS


- 18 The following products are interchangeable within the scope of this PEER:

ACCEPTABLE ALTERNATES				
SUB-CATEGORY	MANUFACTURER	FBC FILE OR NOA	LISTED PRODUCT HEREIN	ALTERNATE
ROOFING INSULATION	GAF	FL16311 or 24-1114.02	EnergyGuard Polyiso Insulation	EnergyGuard NH Polyiso Insulation
			EnergyGuard Ultra Polyiso Insulation	EnergyGuard NH Ultra Polyiso Insulation
			EnergyGuard HD Polyiso Cover Board	EnergyGuard HD Barrier Polyiso Cover Board, EnergyGuard NH HD Polyiso Cover Board or EnergyGuard NH HD Barrier Polyiso Cover Board
			EnergyGuard HD Plus Polyiso Cover Board	EnergyGuard NH HD Plus Polyiso Cover Board
	Georgia-Pacific Gypsum, LLC	22-1223.04	DensDeck Prime	DensDeck StormX Prime Roof Board
VAPOR BARRIER	GAF	N/A	GAF SA Vapor Retarder XL	GAF SA Vapor Retarder XL40

- 19 "MDP" = Maximum Design Pressure is the result of testing for wind load resistance based on allowable wind loads. Refer to FBC (HVHZ) 1620 and [Roofing Application Standard](#) RAS 128 for determination of design wind loads. [\(Notes 9 and 10\)](#)

TABLE 3A: STRUCTURAL CONCRETE DECKS - NEW CONSTRUCTION OR REROOF (TEAR-OFF)
SYSTEM TYPE A-1: BONDED INSULATION, BONDED ROOF COVER*
 REFER TO [NOTE 16](#) FOR VAPOR BARRIER OPTIONS

System No.	Deck (Note 1)	Base Insulation Layer		Top Insulation Layer		Roof Cover (Note 15)	MDP (psf) *
		Type	Attach (Notes 6,7,8)	Type	Attach (Notes 6,7,8)		
C-59.	Structural concrete	(Optional) One or more layers min. 0.5-inch EnergyGuard Polyiso Insulation, EnergyGuard RA or EnergyGuard Ultra	LRF-XF	Min. 1.5-inch EnergyGuard Polyiso-HD Composite Insulation	LRF-XF	TPO-1121 or TPO-3SQ	-165.0
C-60.	Structural concrete	One or more layer(s), min. 0.5-inch EnergyGuard Polyiso Insulation, EnergyGuard RA or EnergyGuard Ultra Polyiso Insulation	LRF-XF	(Optional) Min. 1.5-inch Ultra HD Composite Insulation or min. 0.25-inch DensDeck Prime, DEXcell FA Glass Mat Roof Board or SECUROCK Gypsum-Fiber Roof Board	LRF-XF	TPO-1121 or TPO-3SQ	-180.0
C-61.	Structural concrete	(Optional) Min. 0.5-inch EnergyGuard Polyiso Insulation, EnergyGuard Ultra	LRF-XF	Min. 1.5-inch Ultra HD Composite Insulation	LRF-XF	TPO-1121 or TPO-3SQ	-187.5
C-62.	Structural concrete	Min. 0.25-inch SECUROCK Gypsum-Fiber Roof Board	LRF-XF	None	N/A	TPO-1121 or TPO-3SQ	-195.0
C-63.	Structural concrete	Min. 1.5-inch EnergyGuard Polyiso Insulation, EnergyGuard Ultra	LRF-XF	(Optional) Additional layers of base insulation	LRF-XF or hot asphalt	TPO-1121 or TPO-3SQ	-232.5
C-64.	Structural concrete	One or more layer(s), min. 1.5-inch EnergyGuard Polyiso Insulation, EnergyGuard Ultra	LRF-XF	Min. 0.25-inch DensDeck Prime, DEXcell FA Glass Mat Roof Board or SECUROCK Gypsum-Fiber Roof Board	LRF-XF	TPO-1121 or TPO-3SQ	-232.5
C-65.	Structural concrete	One or more layer(s), min. 2-inch EnergyGuard RA	LRF-XF	Min. 0.25-inch DEXcell FA Glass Mat Roof Board or SECUROCK Gypsum-Fiber Roof Board	LRF-XF	TPO-1121 or TPO-3SQ	-247.5
C-66.	Structural concrete	Min. 1.5-inch, min. 2.0 pcf Insulfoam Roofing EPS	OB500	Min. 0.25-inch DensDeck Prime or DEXcell FA Glass Mat Roof Board	OB500	TPO-1121 or TPO-3SQ	-45.0
C-67.	Structural concrete	Min. 1-inch EnergyGuard RA	OB500	(Optional) Additional layer(s) of base insulation	OB500	TPO-1121 or TPO-3SQ	-45.0
C-68.	Structural concrete	One or more layer(s), min. 0.5-inch EnergyGuard RA	OB500	Min. 0.25-inch DensDeck Prime or DEXcell FA Glass Mat Roof Board	OB500	TPO-1121 or TPO-3SQ	-52.5
C-69.	Structural concrete	One or more layer(s), min. 0.5-inch EnergyGuard Polyiso Insulation, EnergyGuard RA or EnergyGuard Ultra	OB500	Min. 0.5-inch Structodek High Density Fiberboard Roof Insulation	OB500	TPO-1121 or TPO-3SQ	-82.5
C-70.	Structural concrete	One or more layer(s), min. 0.5-inch EnergyGuard Polyiso Insulation, EnergyGuard RA or EnergyGuard Ultra Polyiso Insulation	OB500	Min. 0.5-inch EnergyGuard HD Polyiso Cover Board or EnergyGuard HD Plus Polyiso Cover Board or min. 1.5-inch EnergyGuard Polyiso-HD Composite Insulation or Ultra HD Composite Insulation	OB500	TPO-1121 or TPO-3SQ	-97.5
C-71.	Structural concrete	Min. 2-inch, min. 2.0 pcf Insulfoam Roofing EPS	OB500	Min. 0.25-inch DensDeck, DensDeck Prime or DEXcell FA Glass Mat Roof Board	OB500	TPO-1121 or TPO-3SQ	-120.0
C-72.	Structural concrete	One or more layer(s), min. 0.5-inch EnergyGuard RA	OB500	Min. 0.25-inch DensDeck, DensDeck Prime or DEXcell FA Glass Mat Roof Board	OB500	TPO-1121 or TPO-3SQ	-130.0
C-73.	Structural concrete	(Optional) One or more layer(s), min. 0.5-inch EnergyGuard Polyiso Insulation, EnergyGuard RA or EnergyGuard Ultra Polyiso Insulation	OB500	Min. 1.5-inch EnergyGuard Polyiso-HD Composite Insulation	OB500	TPO-1121 or TPO-3SQ	-165.0
C-74.	Structural concrete	One or more layer(s), min. 0.5-inch EnergyGuard Polyiso Insulation, EnergyGuard RA or EnergyGuard Ultra Polyiso Insulation	OB500	(Optional) Min. 1.5-inch Ultra HD Composite Insulation or min. 0.25-inch DensDeck Prime, DEXcell FA Glass Mat Roof Board or SECUROCK Gypsum-Fiber Roof Board	OB500	TPO-1121 or TPO-3SQ	-180.0